

San Luis Obispo County Air Pollution Control District

Authority to Construct ENGINEERING EVALUATION

I. Permit Processing Summary:

Owner:	Phillips 66 Company 2555 Willow Road Arroyo Grande, CA 93420	Engineer:	DGC
		Appl No:	6015
Contact:	Ms. Kristen Kopp 805-343-3241	Date Rcvd:	Dec 23, 2013
		Incomplete:	Jan 21, 2014
Facility:	Phillips 66 Company 2555 Willow Road Arroyo Grande, CA 93420	Additional Info:	Mar 13, 2014
		Complete:	Dec 16, 2014
Process Address:	2555 Willow Rd., Arroyo Grande		
Reason for Appl:	Increase Crude Oil Throughput		
Permit Number:		(a) Filing Fee Rcvd:	0
Process ID:	2278-1	(b) Processing Fee:	\$9142.50
Facility ID:	13	(b-a) Total Fee Due:	\$9142.50

II. Proposal/Process Description:

Application was submitted to increase the daily maximum crude oil throughput to 48,950 barrels per day, and increase the annual throughput limit to 17,866,750 barrels. An EIR was recently completed and approved for this project by the County Department of Planning and Building. The current APCD PTO 44-52 has limits of 48,000 bbls/day and 16,220,600 bbls/yr. A higher daily limit (than $16,220,600/365 = 44,400$) was previously allowed because the facility is not able to operate every day due to upsets, breakdowns and maintenance requirements. A daily throughput limit of 44,500 bbls/day that is listed on the County's land use permit is also being modified during this EIR process.

The application was amended November 12, 2014 to request a daily crude limit of 48,950 barrels per day, with an annual limit of 17,340,000 barrels per year. That annual limit request was lowered in recognition of the fact that the refinery cannot realistically reach the maximum limit specified in the EIR. Requesting a lower limit reduces the calculated emission increase and the amount of offsets that will have to be provided. Another amendment was submitted December 18, 2014 to again lower the requested throughput further to an amount that P66 is able to offset at this time – 16,860,000 barrels per year. An Authority to Construct is being recommended to allow for a 2% increase in the daily and 4% increase in the annual crude throughput limits. The permit annual limit is listed in terms of a 12 month rolling period, and the current rate is well below that amount. So it will likely be a year or two before the crude throughput approaches the annual permit limit. P66 may submit another application in the near future to bring their annual permitted throughput up to the EIR approved maximum.

III. Applicable Rules:

Rule 204, Requirements (New Source Review): RACT is required for increases from emission units with the potential to emit criteria pollutants of less than 25 pounds per day. BACT is required for new or modified emission units with a potential to emit that exceeds 25 pounds per day. Offsets are required for increases from new or modified emission units where the proposed potential to emit will exceed 25 tons per year.

Section C.2 of this rule lists an exemption from control technology and offsets if the stationary source's net emissions increase of the subject pollutant is less than 0.1 tons per year.

Equipment at the facility that will have an increase in NO_x emissions from this project: B2A/B, B62A/B, B102A/B, B201A/B heaters, B505 cogen. Potential to emit NO_x greater than 25 pounds per day, subject to BACT: B2A/B, B102A/B. The other units are subject to RACT.

Equipment at the facility that will have an increase in SO_x emissions from this project: B2A/B, B62A/B, B102A/B, B201A/B heaters, B505 cogen, B602A/B incinerators, B702 tail gas combustor. Potential to emit SO_x greater than 25 pounds per day, subject to BACT: B2A/B, B62A/B, B102A/B, B505, B602A/B, B702. The other units are subject to RACT.

Equipment at the facility that will have an increase in ROG emissions from this project: B2A/B, B62A/B, B102A/B, B201A/B heaters, B505 cogen.; storage tanks 800, 801, 900, 901, 903. Actual emissions of ROG from all of these sources are well below the BACT threshold. RACT is required for all sources with an increase in ROG.

Control Technology for ROG: A BACT determination for the gas oil tanks was submitted; the facility is currently utilizing that level of control for the gas oil and crude tanks. The pressure distillate tanks are connected to a vapor recovery system, which represents BACT for those sources. No control technology is feasible for the minor amount of ROG emitted from the crude heaters. ERCs will be required to be submitted to offset the relatively small amount of calculated ROG increase.

Control Technology for SO_x: The existing sulfur plant controls meet the requirement for BACT for control of sulfur oxide emissions. The refinery fuel gas is required to meet an H₂S limit of 0.10 grains per dry standard cubic foot (160 ppmv) by 40CFR60.104.a.1, Subparts J and JA – Standards of Performance for Petroleum Refineries. A fuel gas H₂S continuous emission monitor is in place to verify compliance with this requirement. Typical H₂S readings in the fuel gas are below 10 ppmv.

Subpart J also has H₂S, SO₂ and total reduced sulfur compound emission limits from the Claus sulfur recovery plant. Continuous emission monitors are in place to verify compliance with those limits that are listed on the permit. Annual stack emission and relative accuracy testing is performed to ensure that the CEMs are accurate. These sulfur control measures are determined to be BACT for this class of source – a refinery handling heavy, sour crudes.

Control Technology for NO_x: Each heater is considered to be a unique emission unit for this determination. Although they perform a similar function, the individual units at this facility could not all be replaced with one larger heater.

Under Application #6047 P66 has contemporaneously reduced NO_x emissions from Boilers B504 and B506 by 2.66 tons per year, which is the amount of the proposed NO_x increase from this throughput modification. So there is no net increase of NO_x, and under Section C.2 of this rule control technology and offset requirements are not applicable.

B-504 2010 tested NO_x emission rate = 0.0349 lb/mmBTU

B-506 2010 tested rate = 0.0347 lb/mmBTU

With the lower NO_x firing curve now operational for these two boilers, the tested emission rates in 2014 were 0.0263 lb/mmBTU for B-504 and 0.025 lb/mmBTU for B-506. P66 is requesting a revision to the permit to add a new enforceable limit of 0.029 lb/mmBTU for these units.

Boiler heat input from 2010 EI: $(325 + 302 + 324)\text{mmscf} \times 1445 \text{ BTU/scf} = 1,374,195 \text{ mmBTU}$
 $(1,374,195 \text{ mmBTU})/3 = 458,065 \text{ mmBTU/yr}$ assumed from each boiler

Reduction from B-504: $458,065 \text{ mmBTU} \times (0.0349 - 0.029) \text{ lb/mmBTU} = 2,703 \text{ lbs NO}_x$

B-506: $458,065 \text{ mmBTU} \times (0.0347 - 0.029) \text{ lb/mmBTU} = 2,611 \text{ lbs}$

Total actual reduction = 2,703 lbs + 2,611 lbs = 5,314 lbs = 2.657 tons

Rule 216, Federal Part 70 Permits: Major sources emitting >100 tpy of a criteria air contaminant are required to obtain a federally enforceable operating (Title V) permit. This rule includes applicability criteria, application requirements, and procedures for permit content, review, issuance, and revision.

This throughput increase could be considered a Non-Federal Minor Change to the Part 70 permit, since the main change being made is an increase in the facility crude throughput, and that limit is a District-only enforceable permit requirement. This change is not prohibited by any federal regulation, and no addition or revision to federally enforceable conditions is required. So no EPA or public notice is required for this type of change. However this project was subject to a considerable amount of public scrutiny during the EIR evaluation. County Planning and Building revised their land use permit facility throughput limit during the EIR process. The throughput increase will be incorporated into the next Title V permit revision process which will be noticed to EPA and the public. A new natural fired gas engine is now being constructed at the facility under Application #6110. Permit 44 will be revised when that construction is completed, which is expected to be in April 2015.

Rule 219, Toxics New Source Review: Applies to permitted sources that increase toxic emissions that result in $\geq 1.0\text{E-}6$ risk or ≥ 0.10 HHI. Modified sources must increase toxic emissions above permitted or normal operating values to be subject. New and modified sources of toxic air contaminants must show that their emissions will cause a facility-wide cancer risk of $< 1.0\text{E-}6$ and a non-cancer hazard index of < 0.1 , unless they employ toxics best available control technology (TBACT). A facility-wide cancer risk equal to or greater than ten-in-a-million and/or

a non-cancer hazard index equal to or greater than 1.0 are not allowed, unless the Air Toxics "Hot Spots" audit and reduction plan program is required along with Public Notification.

The Final Environmental Impact Report (October 2012) included a health risk assessment using projections of the maximum throughput rate and resultant emission increase allowable under this proposal. That HRA indicated that the highest cancer risk at the facility fence line would be 2.1 in a million from stationary source operations. The estimated chronic and acute risks would be 0.02 and 0.38 respectively. These levels are below the threshold levels of Section E.4 of this rule. Toxics Best Available Control Technology has been applied facility wide to minimize emissions of toxic air contaminants from storage tanks, fugitive emissions and diesel particulate matter from engines. Compliance with this rule is indicated.

Rule 302, Schedule of Fees: Establishes the fee amounts for application filing, permit issuance, permit renewal, and various other actions. Filing fees are credited toward subsequent permit action fees. An evaluation fee will be charged based on the actual time spent to review the application and issue the Authority to Construct.

Rule 402, Nuisance: No source of air pollution is allowed to create a public nuisance. This proposed throughput increase does not require any construction or modification of existing equipment. The net emission increases are relatively minor compared to the overall facility emissions and are not expected to increase the nuisance potential. Continued compliance with this rule is expected.

IV. Equipment Description: Modifications to Permit to Operate 44-52:

- 1) Increase the maximum daily crude throughput limit to 48,950 barrels per day, and increase the annual crude throughput limit to 16,860,000 barrels per year.
- 2) Decrease the Oxides of Nitrogen (NOx) emission limit from Boilers B-504 and B-506 to 0.029 pounds per million BTU heat input.

V. Emissions: This calculation is for an increase of 2% in the daily rate, and 4% in the annual throughput, to 48,950 bbls/day and 16,860,000 bbls/yr.

A. NOx Increase From Heaters

The annual NOx emissions from the heaters can be calculated as follows:

New Annual Throughput limit = 16,860,000 bbls/yr
Current Annual Throughput limit = 16,220,600 bbls/yr Increase = 639,400 bbls/yr

Assume this will be equally processed through the A and B cokers, each unit will process $639,400/2 = 319,700$ BBls/yr.

The net increase in NOx is then calculated by multiplying emission factors for each unit by the project increase in crude rate

For Coker A: $319,700 \text{ Bbls/yr} \times 0.004276 \text{ lbs NOx/Bbl} = 1,367 \text{ lbs/yr}$

For Coker B: $319,700 \text{ Bbls/yr} \times 0.004422 \text{ lbs NOx/Bbl} = 1,414 \text{ lbs/yr}$

This results in a total NOx increase from the heaters of
 $(1,367 \text{ lbs/yr} + 1,414 \text{ lbs/yr}) / 2000 \text{ lbs/ton} = 1.39 \text{ Tons NOx/yr}$

P66 has submitted operational data that shows that steam usage is independent of the crude rate above 40,000 bbls/day. So the proposed increase in crude throughput will not require more steam to be produced and more fuel to be burned in the boilers. There will be an increase in the amount of fuel gas produced and burned in the B505 electric power generation boiler.

$639,400 \text{ Bbls/yr} \times 0.0001684 \text{ mmscf/Bbl} = 107.67 \text{ mmscf}$; increased fuel gas
 $107.67 \text{ mmscf/yr} \times 1482 \text{ BTU/scf} = 159,574 \text{ mmBTU/yr}$; increased heat input

Some of this produced gas will be consumed in the heaters and the balance will be sent to the EPG unit. First the estimated amount of fuel burned in each Coker unit is calculated.

Coker A: $319,700 \text{ bbl/yr} \times 0.1371 \text{ mmBTU/bbl} = 43,831 \text{ mmBTU/yr}$

Coker B: $319,700 \text{ bbl/yr} \times 0.1321 \text{ mmBTU/bbl} = 42,232 \text{ mmBTU/yr}$

Total heater increase = $43,831 \text{ mmBTU/yr} + 42,232 \text{ mmBTU/yr} = 86,063 \text{ mmBTU/yr}$

Amount sent to EPG: $159,574 - 86,063 = 73,511 \text{ mmBTU/yr}$

The average NOx emissions from the EPG, based on recent stack testing = 0.0329 lb/mmBTU

EPG NOx increase = $73,511 \text{ mmBTU/hr} \times 0.0329 \text{ lb/mmBTU} = 2,419 \text{ lbs} = 1.21 \text{ ton/yr}$

So the total facility PTE NOx increase = $1.39 + 1.21 = 2.6 \text{ ton/yr}$

B. ROG increase: From process heaters' exhaust and the crude tanks.

Crude throughput increase = $639,400 \text{ bbls/yr}$, results in 107.67 mmscf increased fuel use, which equates to $159,574 \text{ mmBTU/yr}$ more heat input, as shown immediately above. $86,063 \text{ mmBTU}$ (58.07 mmscf) burned in the cokers, and $73,511 \text{ mmBTU/hr}$ (49.6 mmscf) burned in the EPG.

AP-42 Table 1.4-2 VOC E.F. for natural gas external combustion = 5.5 lbs/mmcf . This factor may overestimate emissions, but no other valid emission factor was located.

$\text{VOC} = (5.5 \text{ lbs/mmcf}) \times (58.07 \text{ mmcf}) = 319.4 \text{ lbs} = 0.16 \text{ tons/yr}$ increase from heaters.

Total Hydrocarbons are tested from the B505 exhaust; a recent tested value from 9/16/14 was 0.0020 lb/mmBTU . $\text{THC} = 0.0020 \text{ lb/mmBTU} \times 73,511 \text{ mmBTU} = 147 \text{ lbs} = 0.074 \text{ ton/yr}$.

Assume all of this THC is VOC.

Crude tanks: P66 routes all of the input crude oil through all three of the tanks for separation purposes. Factors from AP-42 Chapter 7 were used to estimate the increase in emissions from Tanks 900, 901 and 903. These factors have been entered in the District's emissions inventory spreadsheet, which was used to calculate an increase of 0.288 ton/yr ROG for the proposed facility throughput increase to $16,220,600 \text{ bbl/yr}$.

So the total ROG increase = $0.16 + 0.074 + 0.288 = 0.522 \text{ ton/yr}$

C. SOx increase: 107.7 mmscf/yr increase in fuel gas burned calculated above. Average total sulfur in the fuel gas averaged over three years = 346 ppm, as H₂S.

$(107.7 \text{ mmscf/yr} \times 346 \text{ ppm}) / 379.6 \text{ cf/lb mole} = 98.167 \text{ lb moles/yr H}_2\text{S}$

One mole of H₂S produces one mole of SO₂

$98.2 \text{ lb moles/yr} \times 64 \text{ lbs SO}_2/\text{lb mole} = 6,284.8 \text{ lbs} = \mathbf{3.14 \text{ tons SO}_2/\text{yr increase}}$

VI. Conditional Basis: The following two conditions should be included in the cover letter to prevent these limits from being considered federally enforceable on the Title V permit.

1. Prior to increasing the existing permitted limit through rate to 48,950 barrels per day (wet basis) and 16,860,000 barrels per year (12 month rolling period, wet basis), Phillips 66 shall:
 - a. Demonstrate compliance with all the mitigation measures of the Final Environmental Impact Report for this project and obtain approval from the San Luis Obispo County Planning and Building Department.
 - b. Submit APCO approved Reactive Organic Gas (ROG) Emission Reduction Credits in the amount of 0.522 tons per year.
 - c. Submit APCO approved Sulfur Oxides (SO_x) Emission Reduction Credits in the amount of 3.14 tons per year.

2) Oxides of Nitrogen (NO_x) emissions from Boilers B-504 and B-506 shall not exceed 0.029 pounds per million BTU heat input.

VII. Conclusions/Recommendations: I recommend that an Authority to Construct for the equipment listed in Section IV be issued with no operating conditions.

BY: _____ DATE: _____
Air Pollution Control Engineer

APPROVED: _____ DATE: _____
Engineering Supervisor

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